

Status of Revercomb Evaluation/Validation Activities

CIMSS/SSEC/UW-Madison

- ARM Site Atmospheric State Best Estimate
- Forward Model
- Obs-Calcs using ARM site and global radiosondes*
- Broadband radiance comparisons using Geo imagers*
- NeDT estimation using Earth Scene Data*
- CY2002 aircraft underflight opportunities
- LST/□ validation at selected ground truth sites

*Early L1B

evaluation

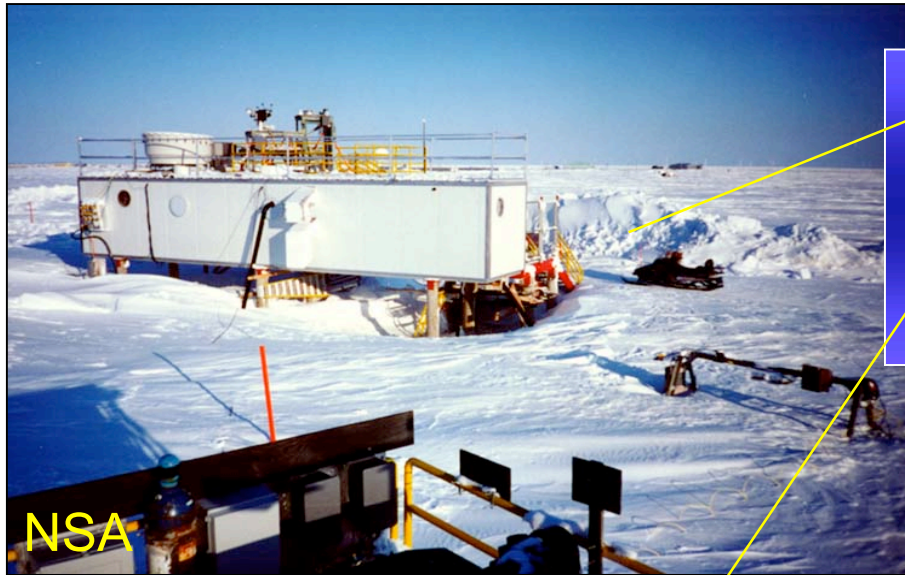
- Miscellaneous
 - web page: <http://airs3.ssec.wisc.edu/~airs/>
 - Polar Quicklook Images
 - Required Data Summary



AIRS Science Team Meeting. 12-14 Feb 2002. Suitland, MD



ARM Site Atmospheric State Best Estimate



ARM Site Atmospheric State Best Estimate

- SGP v0.5 is a working prototype
 - Files available from <http://airs3.ssec.wisc.edu/~airs/aaasbe/>
 - Runs off ARM site matchup files. Getting these daily from NOAA.
 - Does MWR radiosonde scaling and interpolation to overpass time.
 - Some new fields in output file: matchupFile, cloudLayers, ...
- SGP v0.6 under development
 - Accounts for spatial gradients w/in AMSU footprint. Uncertainty estimates. Better Missing Data/Error handling.
- Recent ARM Water Vapor Workshop:
<http://glacier.ssec.wisc.edu/~davet/November2001WaterVaporMtg/>
- Identifying data sources for NSA and TWP sites. ECMWF model data ?
- Need list of desired launch times for dedicated sonde launches for each site
- Input for IEEE paper provided on Jan 16

<http://airs3.ssec.wisc.edu/~airs/aaasbe/>

|-- armBestEstimateFiles/

|--nsa/

|--sgp/

|--v0.5/

|-- 2002-01-23-192501/

|-- 20020123_1810_vis_1km.gif

|-- 20020123_1815_ir.gif

|-- 20020123_1910_vis_1km.gif

|-- 20020123_1915_ir.gif

|-- 20020123_2010_vis_1km.gif

|-- 20020123_2015_ir.gif

|-- armbe_sgp_v0.50_2002-01-23-192501.cdf

|-- plot1.png

|-- plot2.png

|-- plot3.png

|-- plot4.png

|-- 2002-01-23_v0.50.log

|-- 2002-01-24_v0.50.log

|-- 2002-01-25-191101/

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|-- plot1.png

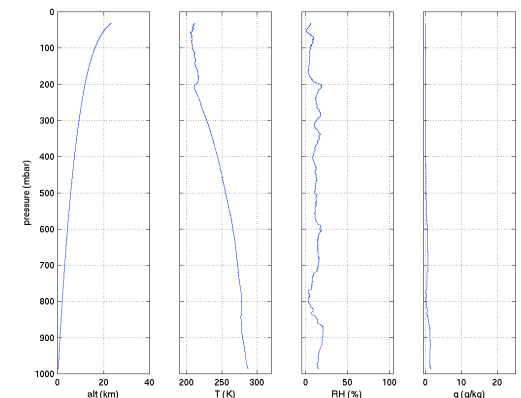
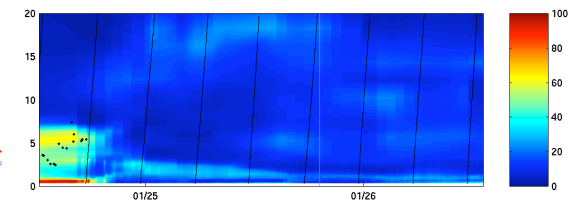
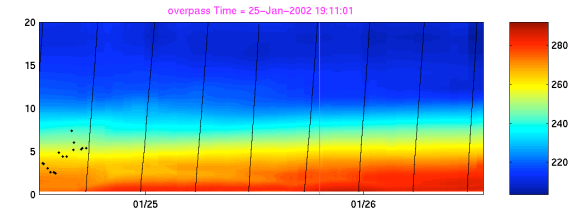
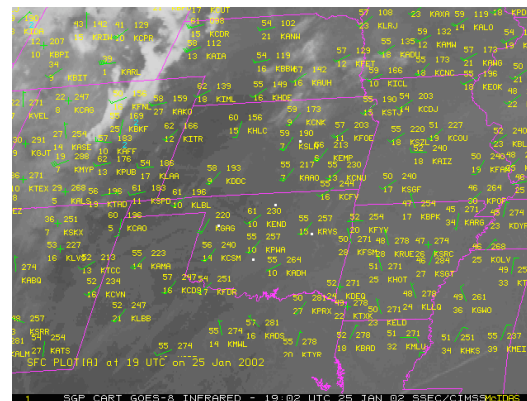
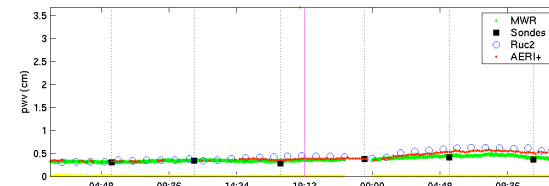
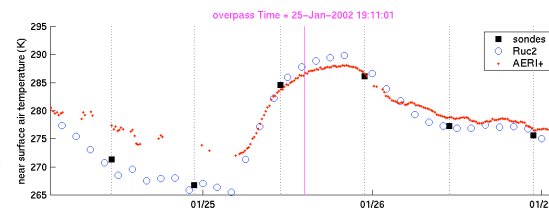
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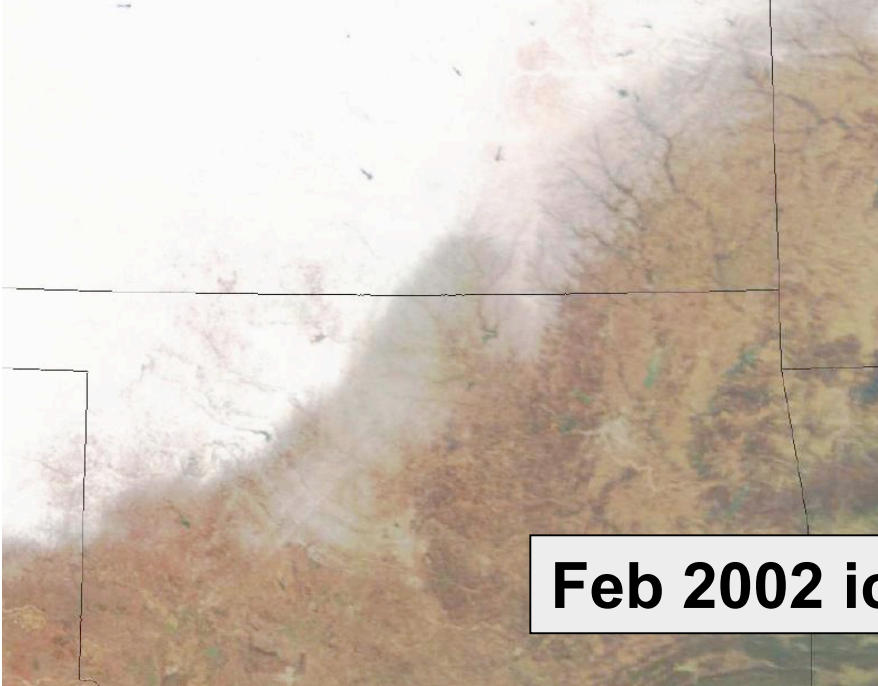
|-- plot3.png

|-- plot4.png

|-- 2002-01-25_v0.50.log

...





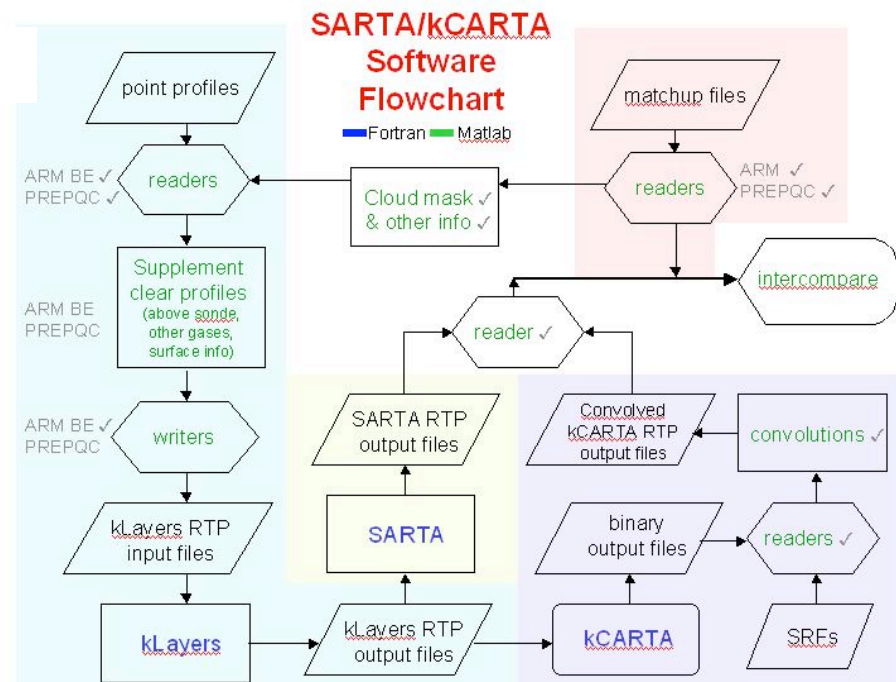
Feb 2002 ice storm at SGP



Photos c/o Jim Liljegren, ARM

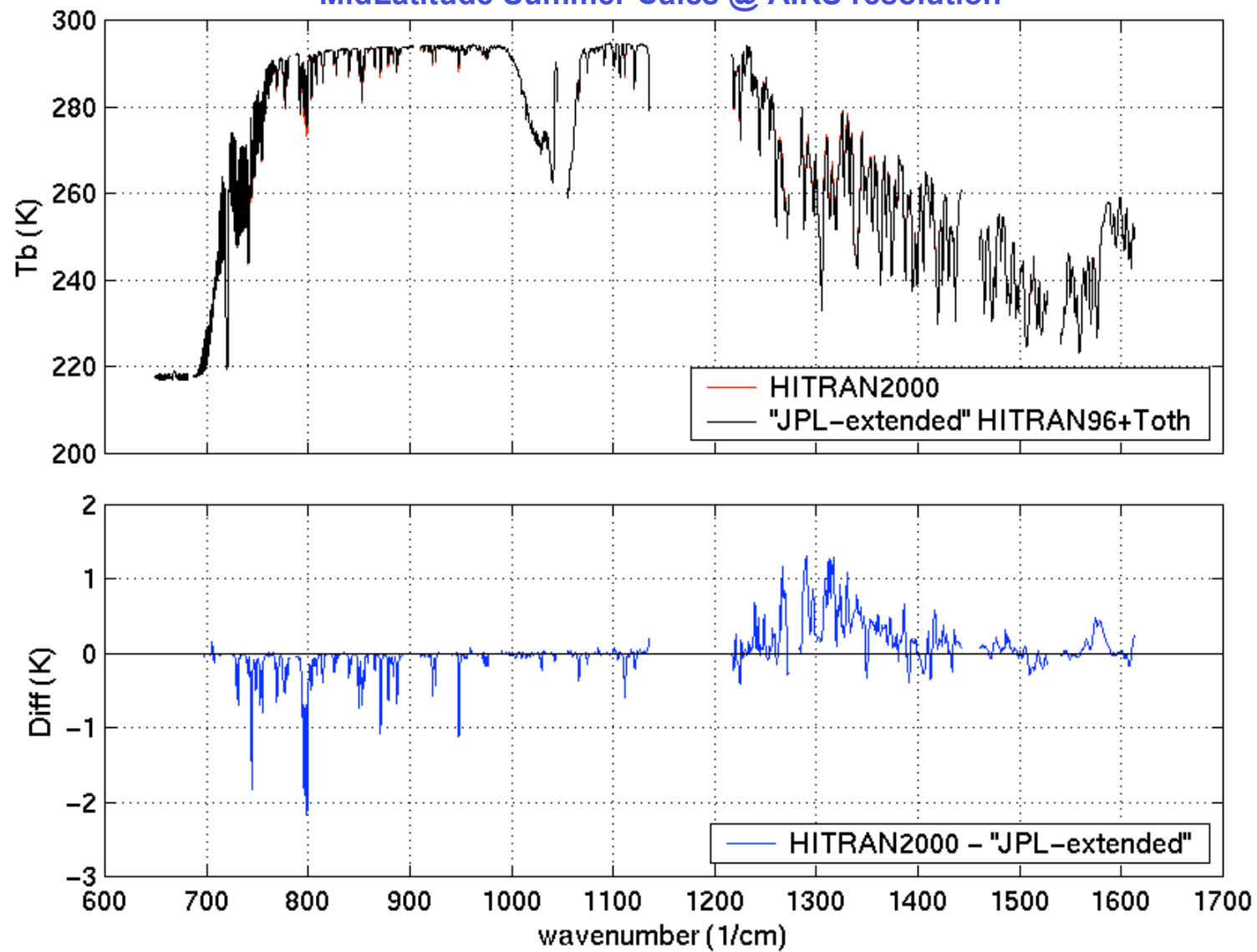
Forward Model

- RTP, kLAYERS, SARTA, kCARTA, and convolutions (versions of Sept 2001) working and tested
- Working on interface to PREPQC/ARM site files (for early L1B obs-calcs)
- Received Feb'02 package from UMBC. Working on installation and testing
- IASI Line-by-Line Intercomparison Report
- New clear sky case from AFWEX available
- HITRAN 2000 !



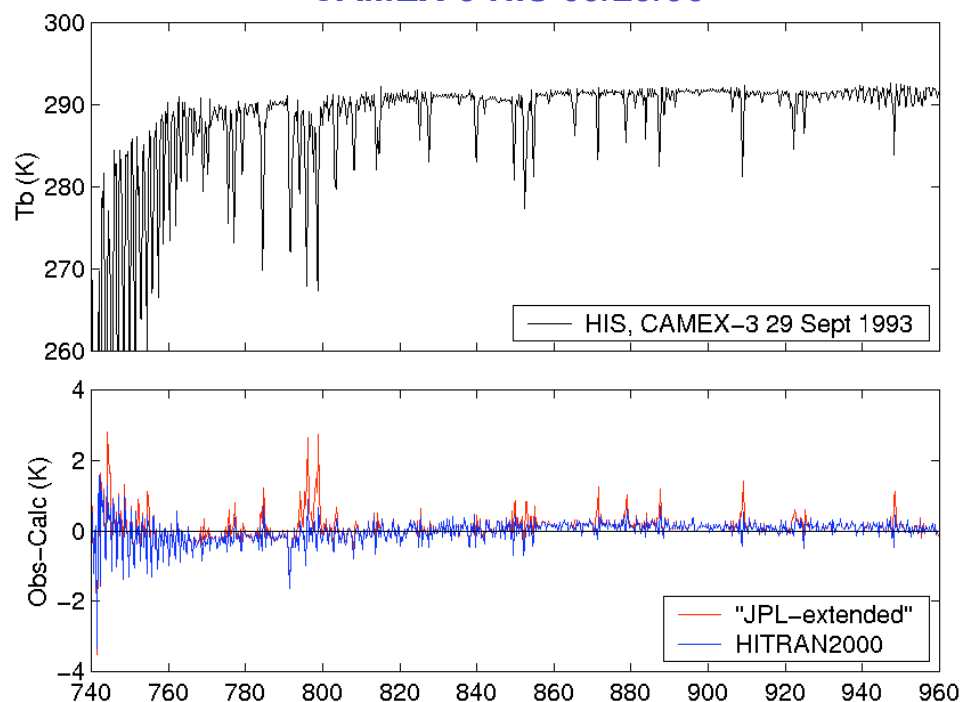
HITRAN 2000

MidLatitude Summer Calcs @ AIRS resolution

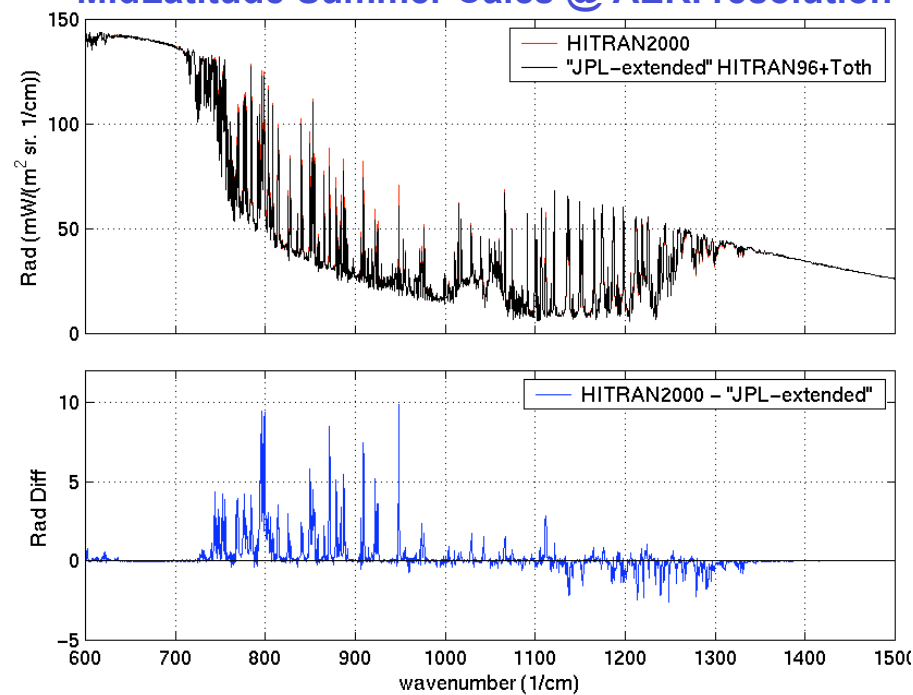


HITRAN 2000

IASI Line-by-Line Intercomparison Case CAMEX-3 HIS 09/29/93



Downwelling MidLatitude Summer Calcs @ AERI resolution



Obs-Calcs using ARM site and global radiosondes

- **Goal**

Early spectral calibration evaluation and early radiance evaluation of mid-tropospheric channels. Monitoring of spectral behavior during transient cool down periods. Forward model evaluation.

- **Approach**

Using ARM site best estimate, PREPQC, and matchups:

- choose T_{skin} to minimize 10 μm window obs-calcs.
- feed profiles and surface info into SARTA, or kCARTA as required
- sort matchups for clouds and analyse obs-calcs

- **Status**

- Continuing to work on PREPQC/ARM site/matchup software interface to SARTA/kCARTA
- Analysis of clear sky Terra MODIS overpasses of SGP site is on-going

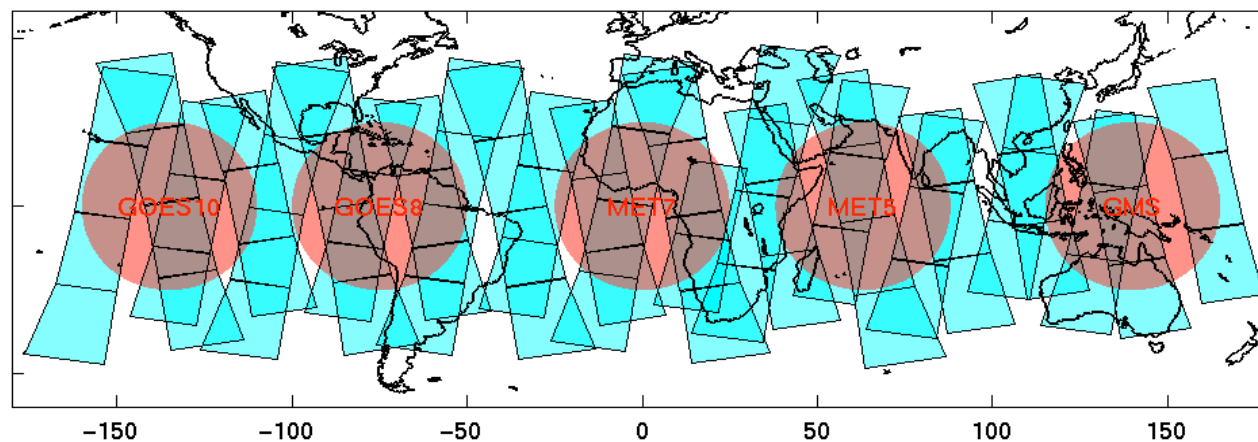
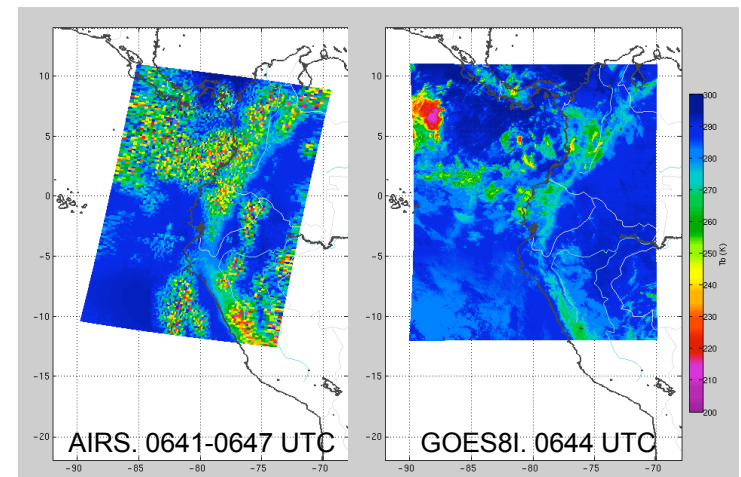
Early broadband comparisons using Geo's

- **Approach**

- Convolve AIRS with GEO SRFs, interpolate to common spatial scales, and make comparisons with GEOs at GEO sub-satellite points

- **Status**

- GEO data will be gathered as part of larger GEO/Polar InterCal project, in collaboration with Mat Gunshor (UW-SSEC).
- Will do comparisons with CERES 8-12 μ m channel for same cases. Will get CERES data from Langley DAAC.



NeDT estimation using Earth Scene Data

- **Approach**

- Using any granule, 1) generate principle components (PCs) of the covariance matrix of the spectra within the granule, 2) reconstruct the spectra using a reduced number of PCs, and 3) use statistics of the reconstruction error to derive noise estimates.

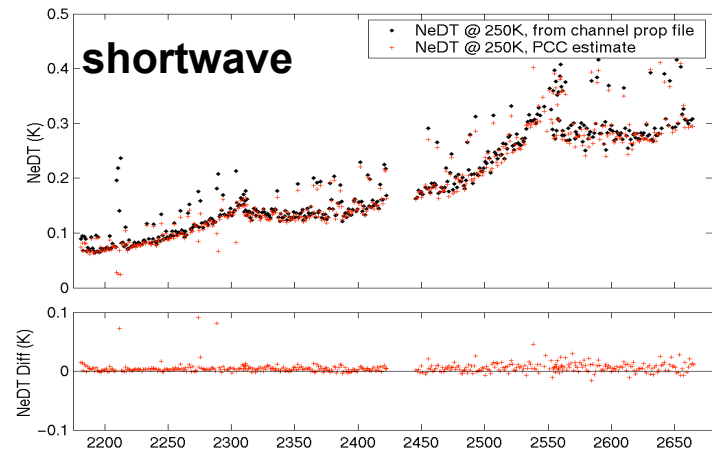
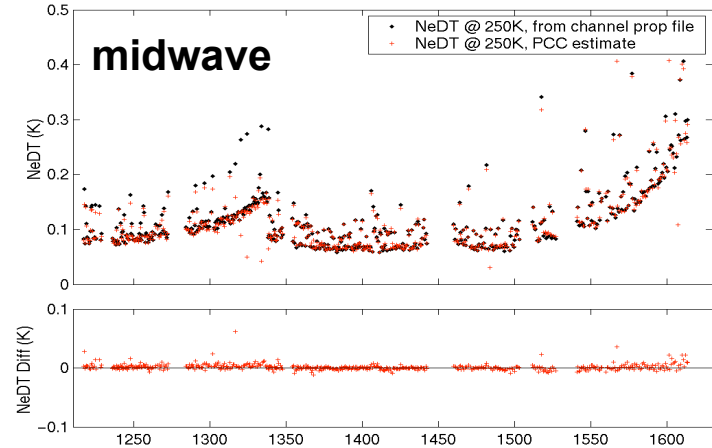
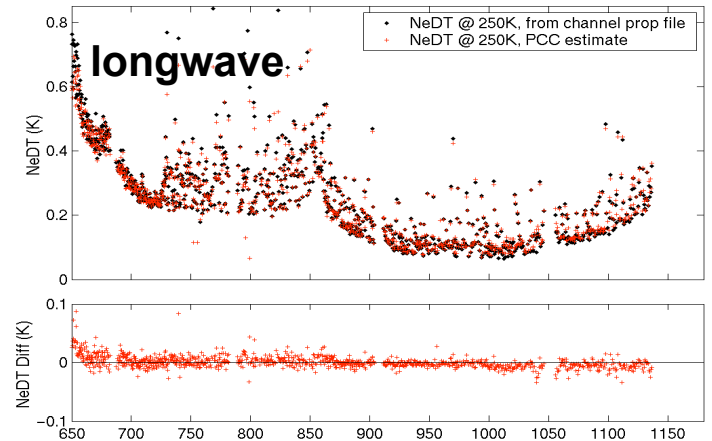
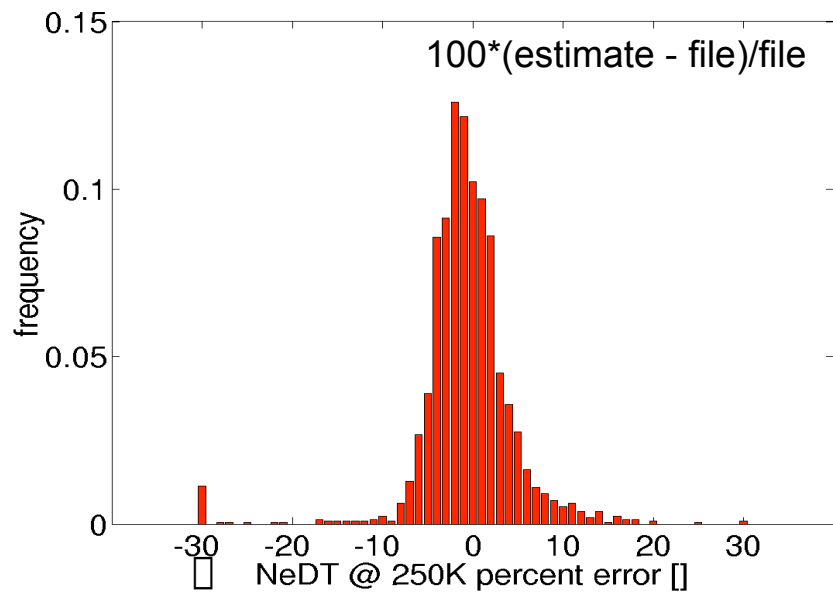
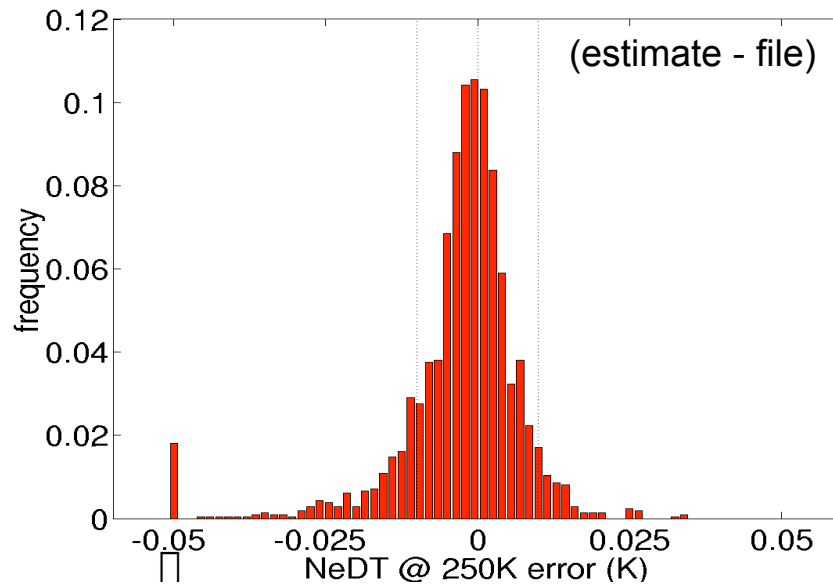
- **Status**

- Use an entire granule in each analysis
- Considering modification of approach: divide spectra by a nominal pre-launch noise estimate before PC analysis
- Examples using Scanning-HIS data
- Sample code available from <http://airs3.ssec.wisc.edu/~airs/noise/>

Estimated versus Channel properties file

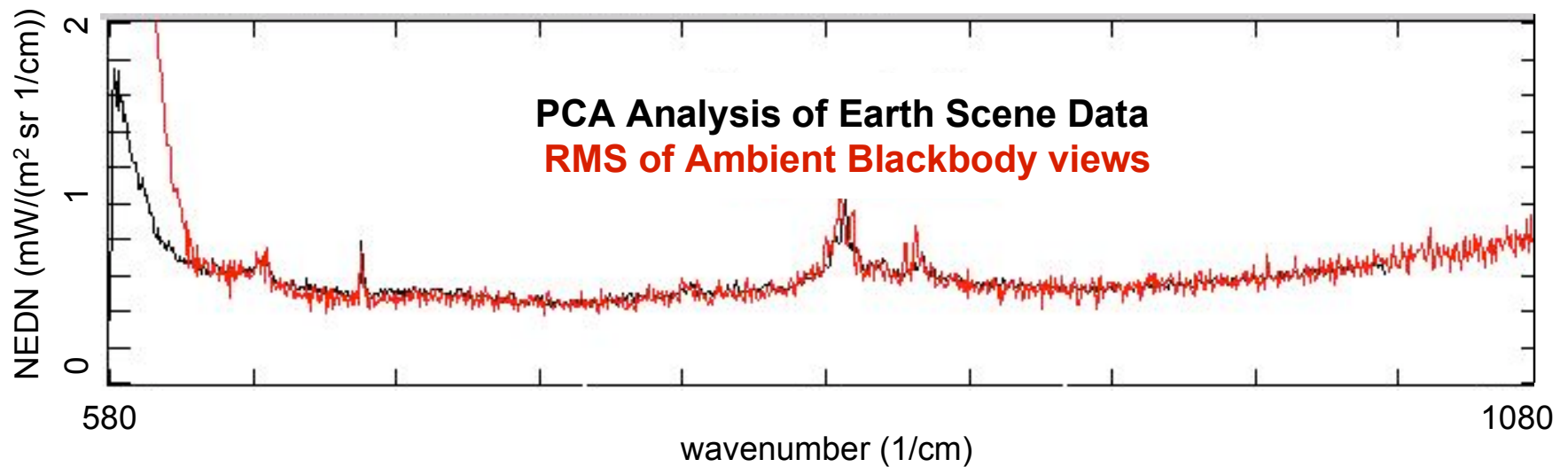
Simulated 15-Dec-2000 granule 084

(shown at November 2001 Science Team Meeting)



NeDT estimation using Earth Scene Data

Scanning-HIS LongWave NEDN on NASA ER-2



*spectra not divided by nominal noise before PC analysis

CY2002 aircraft underflight opportunities

- Flights of opportunity:
 - Scanning-HIS on NASA DC-8 during IHOP
 - NAST-I on Proteus during IHOP
 - NAST-I on Proteus during CRYSTAL-FACE
- Aqua Validation Mission:
 - Scanning-HIS on NASA ER-2 during Texas2002

IHOP, International H₂O Project:

- 13 May - 25 June. SGP site domain
- http://www.atd.ucar.edu/dir_off/projects/2002/IHOP.html

CRYSTAL-FACE:

- 1 July - 31 July, Southern Florida
- <http://cloud1.arc.nasa.gov/crystalface/>

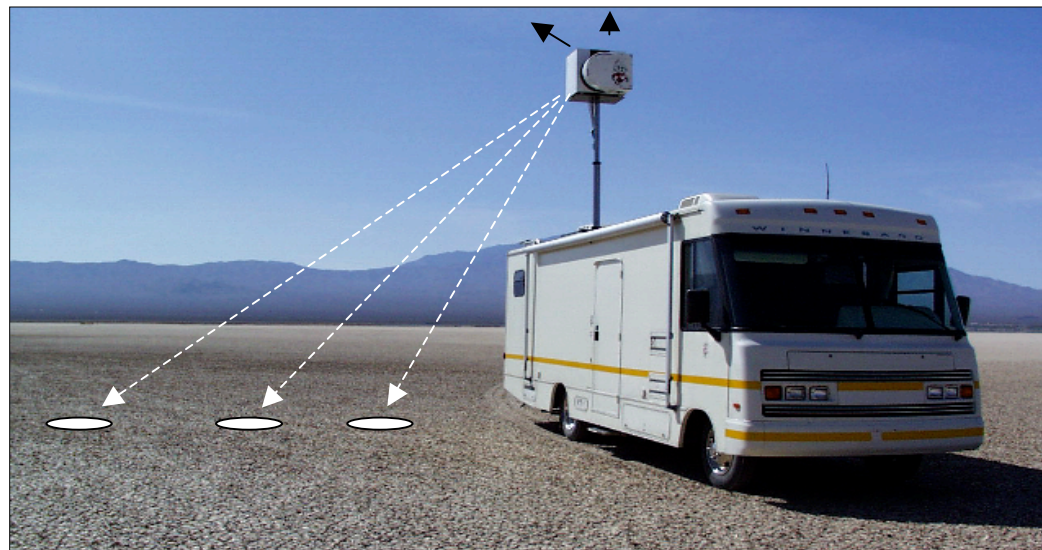
Texas2002:

- September or October. Gulf of Mexico, SGP ARM site, Louisiana coast
- MAS, S-HIS, CPL on NASA ER-2

LST/□ validation at selected ground truth sites

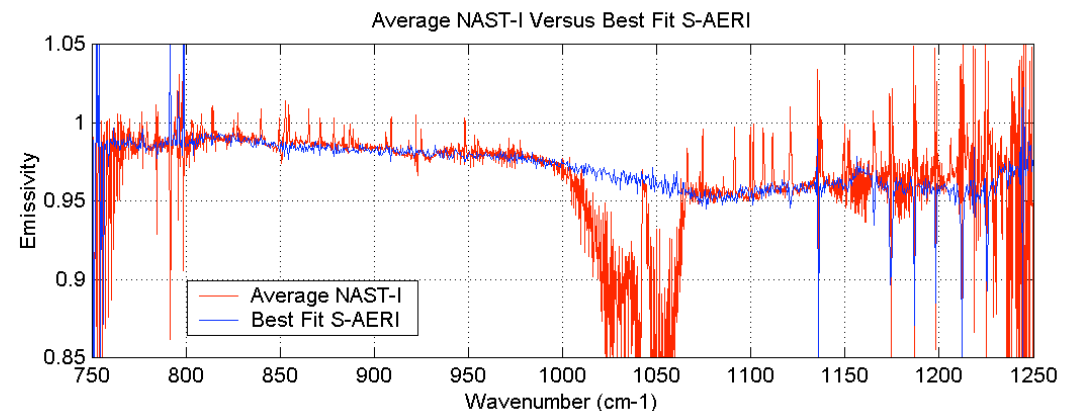
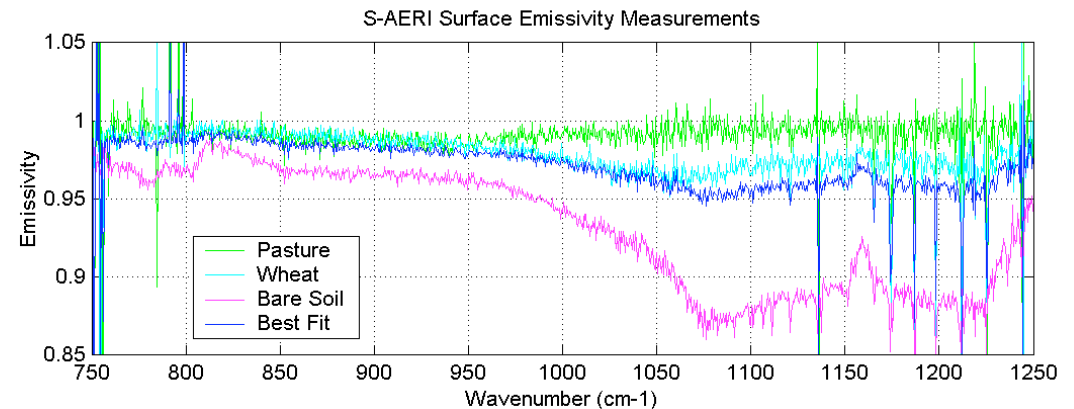
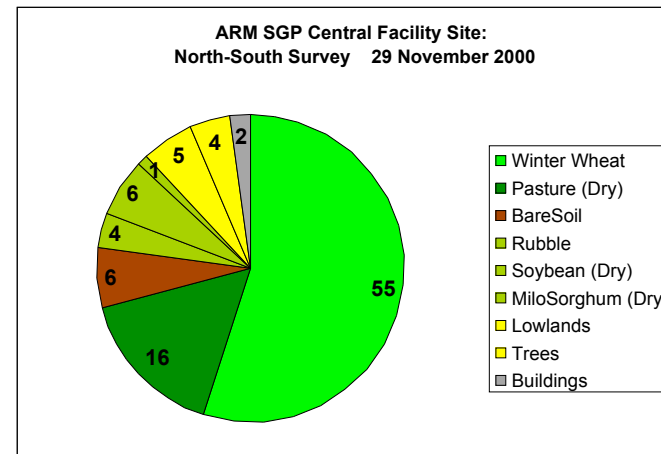
Status:

- AERI-bago upgrades: Mechanical cooler, Automatic rain hatch.
- CY2002 plans for ARM SGP Central Facility measurements:
 - IHOP: AERI-bago and field survey centered on overpass times during the first week of June, plus flights of opportunity of DC-8 and Proteus
 - Texas2002: One week AERI-bago and field survey centered on overpass times, plus flights of opportunity of ER-2

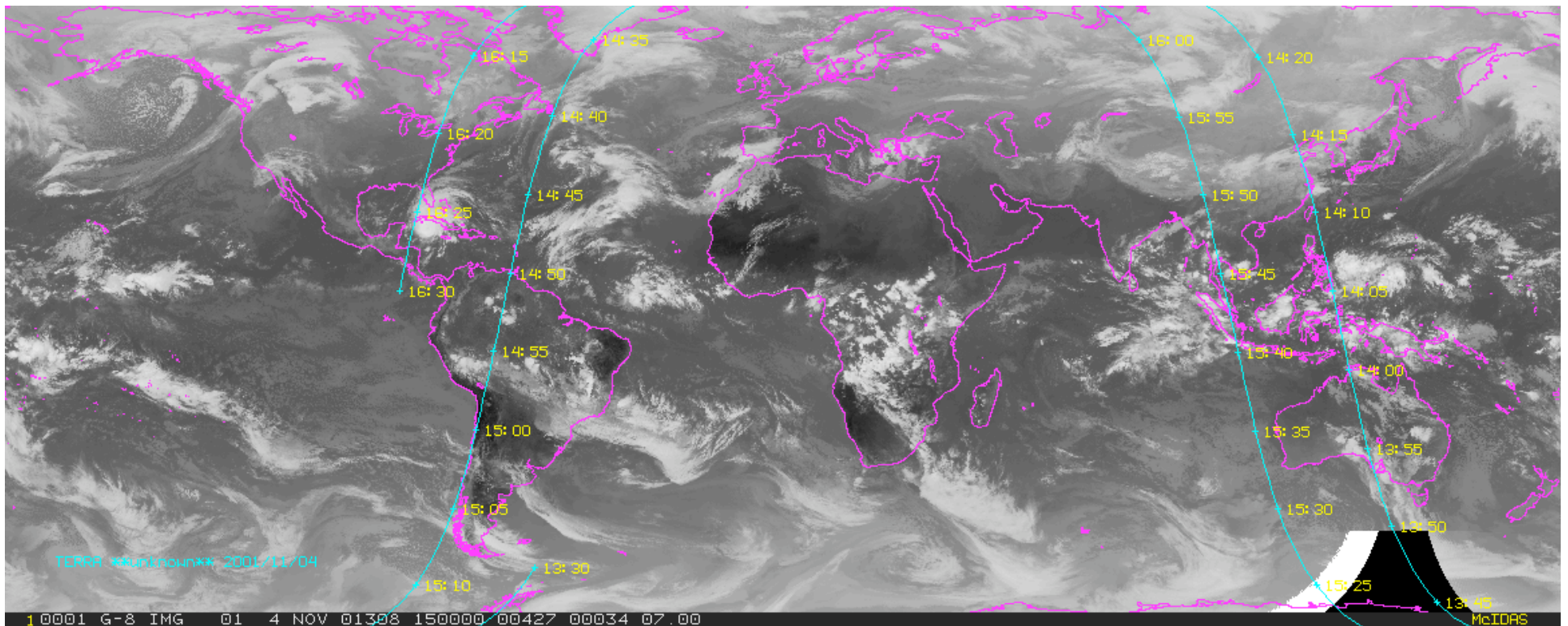


Surface Type/Emissivity Survey

A survey was conducted on 29 Nov 2000 to characterize the surface type and spectral emissivity in the vicinity of the ARM SGP Central Facility site.



Geo Quicklooks



IR window composites with orbit tracks updated every three hours

ftp://pm.ssec.wisc.edu/pub/terra_ir_orbs/

Thanks to Jerry Robaidek, UW-SSEC



Required Data

- ARM Atmospheric State Best Estimate and Obs-Calcs
 - overpass prediction for sonde launch planning → list of desired launch times for each site
 - ✓ ARM site matchups. Currently using NOAA matchups w/ simulated data
 - Model data for NSA and TWP sites. ECMWF
- Global Radiosonde Obs-Calcs
 - ✓ PREPQC and matchups. Needed ASAP for early monitoring of spectral behavior
 - ✓ ARM site profiles and matchups
- Geo and CERES comparisons
 - ✓ Geo data at sub-satellite points at Aqua overpass time
 - ✓ L1B granules over Geo sub-satellite points
 - CERES data over Geo subsatellite points from LaRC DAAC
- Noise analyses
 - ✓ any L1B granule
- LST/□
 - ✓ ARM site matchups
 - other sites: SurfRad @ Bonneville, IL (40.05N, 88.37W), FluxNet @ Park Falls, WI (45.95N, 90.27W), UW Farms @ (43.07N, 89.55W)
 - ✓ L1B granules over the particular sites
- Aircraft (e.g. SHIS/NASTI) underflights
 - ✓ L1B granules of site

